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up the hill injurious, and two complained, not about the hill, but the stairs at the University. Only three or four take systematic exercise. Thirteen assist in making their own wardrobe, and 30 take care of their own rooms.

The same list of questions was sent to the graduates. The State University of Kansas has graduated 101 women in all from the regular collegiate courses. Three of the graduates have died, while the addresses of three others could not be obtained; therefore, 95 communications were sent; 55 replies have been received; 32 of the 55 report health in college the same as before entering; 8 report health worse while in the University — 2 of the 8, however, for a portion of one year only; 11 report health while at the University much better than before entrance. All those who reported (and many did so report) "If there was any change, it was for the better," were included in the list "health the same." Forty-one report health since leaving school "good," or "the same;" 6 report health "better since graduation," and 6 "health not so good;" 35 consider that University life has no effect upon health at all; 4 believe that health is injured by University work, and 9 state that their health was much improved by their college experience; 3 report "climbing the hill" injurious, and 44 not injurious; on the other hand, many consider the hill "a blessing." The alumnæ spent, on an average, 9½ hours per day in study and recitation. Twenty-one of these 51 who have reported are married.

I wish I could tell you all the valuable suggestions sent to me in reply to the question, "What suggestions would you make in regard to improving the physical health of Kansas State University women?" Space, however, will forbid the inclusion of but one or two of these replies. Many of the graduates suggest that the girls should avoid too much social recreation of one character — dancing; but urge that more frequent formal receptions and social gatherings, at which the girls could meet and talk with cultured people, would be a lasting pleasure and benefit to them. All are unanimous in the wish for a gymnasium, in which the girls could receive systematic physical training.

NOTES ON SOME NEW SPECIES OF FOSSIL CEPHALOPODS.

BY ROBERT HAY, F. G. S. A.

Five years ago the writer obtained, from strata that he has been calling permo-carboniferous, near Junction City, a fragment of a large nautiloid cephalopod. Having the impression that the fossils of the region had been exhaustively examined, he kept it without special note, not seeking then to have its species identified. Three years ago a fine cephalopod of a distinct type was given to me by Capt. Geo. E. Pond, quartermaster of Fort Riley, who had obtained it from the quarries worked on the military reservation. I obtained others about the same time from nearly the same horizon, further to the southwest. Captain Pond was also making a collection to go to the museum at West Point, and I undertook to have them named for him. The result was, I sent his collection and my own to Prof. Alphæus Hyatt, of Boston, our best authority on cephalopods. This was early in 1890. About the same time Professor Hyatt received a collection from the geological survey of Texas, from about the same horizon, and he also examined a number of specimens in the National Museum, at Washington, that had been sent from Kansas by Doctor Newlon, of Oswego.

Among the Texas specimens were some of the same species as those from Geary county, Kansas, but most of them, whether from Kansas or Texas, were new species. Three from Doctor Newlon were also new species, one of them being a new genus.

All the species have been described by Professor Hyatt in the recently issued Second Annual Report of the Geological Survey of Texas. Dr. Newlon and myself have had our names given to one species each, and one species of which the type specimen was also from Kansas has been named for Professor Dumble, the director of the Texas survey. The entire list is as follows:

Temnocheilus crassus, Oswego.
Metacöceras dubium, Junction City.
Metacoceras Hayi, Junction City.
Metacoceras inconspicuum, Junction City.
Domatoceras umbilicatum, Oswego.
Asymptoceras Newloni, Oswego.
Phacoceras Dumbli, Junction City.

There are other specimens described by Professor Hyatt, but as they are not new we omit them.

Doctor Newlon's specimens are from carboniferous strata. The higher beds in Geary county, as I have remarked previously, I have called permo-carboniferous. Recently Professor Tchernyschew, of St. Petersburg, in company with Prof. H. S. Williams, of Cornell University, have made a short examination of the section exposed at Fort Riley, and, while agreeing that the lower beds are permo-carboniferous, they state that the upper beds — where the Phacœras is — are decidedly permian, the Russian professor assuring me that both faunal and lithologic characters can be duplicated in the permian of his own country. How this will affect the classification of Professor Hyatt I do not know, but in his report he treats all the specimens as carboniferous.

Professor Hyatt's descriptions are as follows:

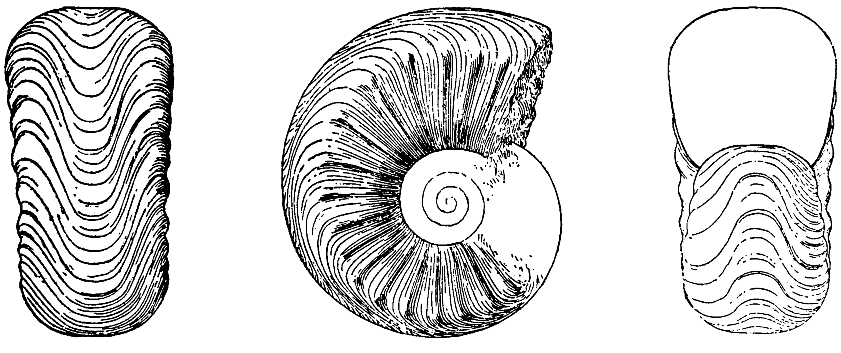

Fig. 3. Fig 4. Fig. 5.

Temnocheilus crassus, n. s.

Loc., near Oswego, Kas.

Carboniferous. Coll. National Museum.

Figs. 3, 4, and 5, magnified one-third.

This species is represented only by a fragment; but the characteristics are so peculiar that there is apparently little doubt of its being the representative of a distinct form.

The sides are convex and do not converge towards the umbilici so abruptly as in most forms of this genus. They are covered by numerous well-defined straight pilæ, terminating in small nodes at the edges of the abdomen. The abdomen is convex, with a narrow, slightly-depressed zone along the center. The shell is ornamented by prominent striæ of growth, and at regular intervals one of these is more prominent than the neighboring striations, showing frequent short arrests of growth. These striæ are straight upon the sides, but upon the abdomen bend suddenly posteriorly, forming wide sinuses of great depth; doubtless the aperture was similar. The sutures are almost straight on the sides and have a very broad and slight ventral lobe. Siphuncle unknown.

This shell is very similar to *Nautilus falcatus* L. de C. Sowerby, [see Prestwich, Geol. Coalbrookdale, Trans. Geol. Soc. London, V, pl. 40,] in so far as they both have ribs. The Coalbrookdale specimen, however, has no tubercles, or at least none are given, and the sides of the whorl are figured as concave. *Naut. Nikitini* Tzwetaev, [see *op. cit.*, pl. I, fig. 5,] is also very similar, but the ribs are less numerous and the sutures quite different. *Nikitini* has saddles and lobes as in *Tainoceras*. Living chambers were not observed. Position of siphuncle is unknown.

Figs. 3 and 4 show the fragment, and fig. 5 is therefore in part a restoration.

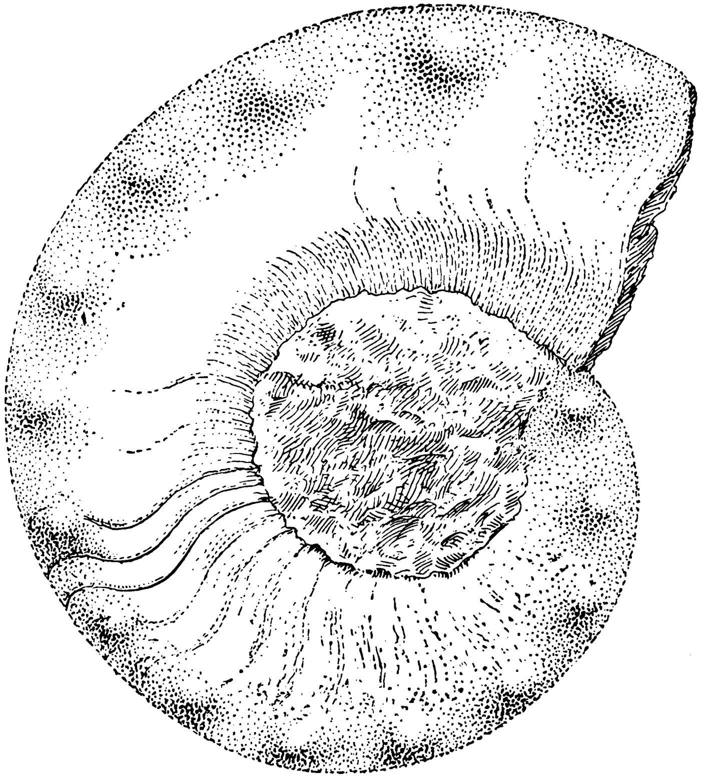

FIG. 6.

METACOCERAS DUBIUM, n. s.

Loc., Kansas. Coll. R. Hay.

Figs. 6 and 7, natural size.

There are no lines of abdominal tubercles, only low, broad, longitudinal swellings on either side of the depressed central zone of the abdomen, and the nodes on the sides are large and prominent, as in other species of this genus. The sides, however, are narrow and slightly concave, and internally a ridge is formed, on account of the suddenness with which they incline to the umbilicus at the dorsal shoulders.

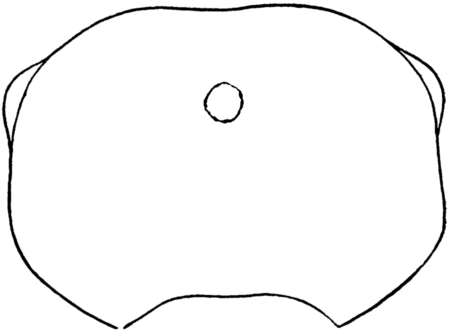

Fig. 7.

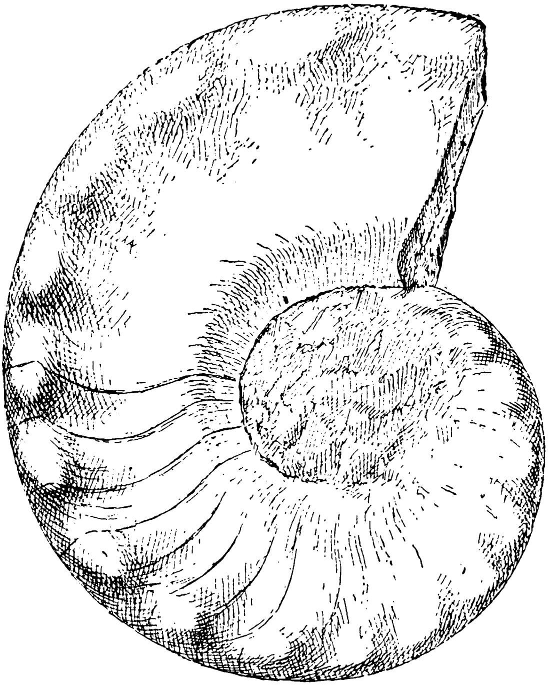

Fig. 8.

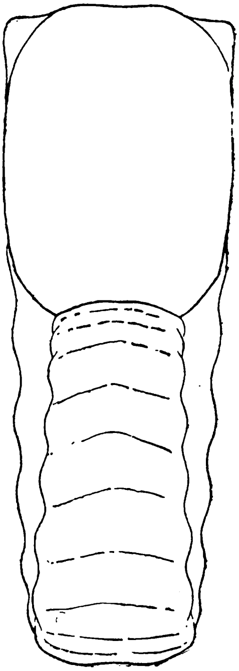

Fig. 9.

Metacoceras Hayi, n. s.

Loc., Kansas. Coll. R. Hay.

Figs. 8 and 9, natural size.

This cast has broad, flattened sides, having angular, umbilical shoulders where the sides descend abruptly to the umbilici. There is an outer row of tubercles on the edge of the abdomen. These are elongated longitudinally, and the depressions between them are often very distinct; the surface of the cast is otherwise smooth. The sutures have short and very broad lateral lobes, with saddles at the umbilical shoulders and on the abrupt edges of the abdomen. The abdominal lobe is short and broad. It has a slight angle or V-shape in the specimen, but this is probably due to compression. The sutures just inside of the umbilical shoulders appear to be nearly straight on the nearly vertical narrow zones on either side of the outer whorl, but there is probably a shallow dorsal lobe on the impressed zone. The living chamber is about one-fourth of a volution in length, and still incomplete. The specimen is much narrowed by compression, and, making due allowance for this, the abdomen is slightly broader than the dorsum, measuring through the umbilical shoulders, and it has been so represented in the drawing. The amount of involution is slight, the whorls being in contact only along the surface of the slightly convex abdomen, and there is, consequently, only a shallow impressed zone in the dorsal surface of each whorl. Nevertheless, the increase by growth in the dorso-abdominal diameter of the whorl is evidently rapid.

Specimens of this and some other species were received through the courtesy of Capt. George E. Pond, of Fort Riley, Kas.

The front view (fig. 9) is in large part restored from a much-compressed specimen.

Its nearest ally occurs in the carboniferous in Russia. It differs from *Metacoceras* (*Nautilus*) *Tschernyschewi* Tzwetaev, [see Ceph. du Calc. Carbonifère de la Russie Centrale, Mém. du Com. Géol., V, No. 3, pl. 2, figs. 7–9,] in having somewhat broader sides and a narrower abdomen at the same age, and fewer tubercles. These also are elongated longitudinally, whereas in *Tschernyschewi* they are elongated transversely, forming a series of rib-like folds.

METACOCERAS INCONSPICUUM, n. s.

Loc., Kansas.

Coll. R. Hay.

Figs. 10 and 11, natural size.

This cast has an aspect which at first sight leads one to think it is a species of *Tainoceras*, but the abdominal sutures are deficient in the pair of saddles distinguishing that genus, and there are no lines of abdominal tubercles. The whorl increases in abdomino-dorsal diameters faster than *Metacoceras cavatiformis*, but not in the transverse diameters; the whorl is, consequently, more compressed. The umbilical shoulders are not so angular as in that species, and the sides broader and less convergent outwards, and the tubercles upon the outer border of the sides are less conspicuous upon this cast. The sutures have about the same general contour as in the nearest ally just mentioned, but the lateral lobes are broader and shallower, and

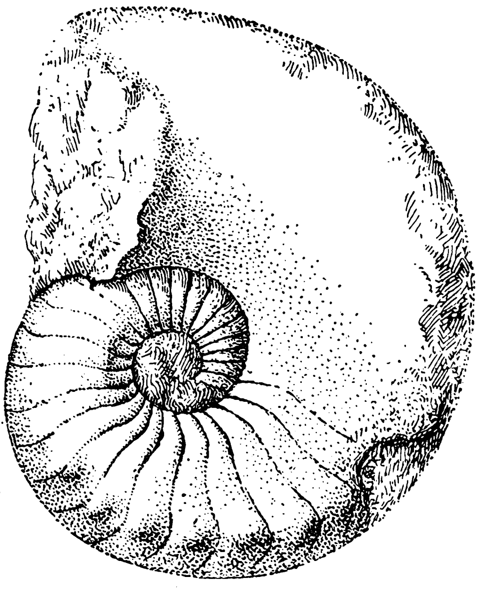

FIG. 10.

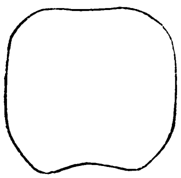

FIG. 11.

the saddles at the umbilical shoulders are not so prominent. The young do not seem to have the pilæ so plainly shown in the umbilicus of *Metac. cavatiformis*, but the cast may deceive the observer in this respect.

Fig. 11 represents a section of the adolescent whorl without tubercles.

DOMATOCERAS, n. g.

The species representing this genus is more closely allied to forms of *Centroceras* than to those of any other genus, but these, so far as known, have very peculiar and distinct characteristics. Although resembling this species in the external parts of the transverse section of the whorls and in the sutures, they differ in many ways. This is a true nautilan form, the impressed zone being a marked characteristic affecting the dorsal outlines of the sutures in this species, whereas the typical centroceran forms are gyroceran, having the impressed zone present only in the advanced stages of growth of some forms. The nealogic stages in Centroceras remain similar to the adults of Temnocheilus for a prolonged period, and the tubercles remain prominent, even on the casts throughout the later nealogic (adolescent) and earlier ephebolic (adult) stages. No tubercles were observed in *Domatoceras umbilicatum*, although it was sufficiently well preserved to have shown them had they existed. They might have been present in the earlier nealogic stages which were not visible. In Centroceras, the young whorl throughout the later nealogic stages is tetragonal, but the sides are divergent, the abdomen being broader than the dorsum. In this species, during the same stages, the sides are nearly parallel or only slightly converfient, and the abdomen nearly equal to or somewhat narrower than the dorsum.

Centroceras (*Temnocheilus*) *Scottense* (sp. Worthen, [see Geol. Surv. Ill., VIII, pl. 27, fig. 3]) is a good example of the genus Centroceras, having all the characteristic markings and forms of that genus.

DOMATOCERAS UMBILICATUM, n. s.

Loc., Oswego, Kas. Lower coal measures.

Coll. Nat. Mus., by Dr. Newlon.

Fig. 12, natural size of living chamber at first septum.

This species reaches a considerable size, the specimen here described being about 217 mm. in diameter.

The living chamber is incomplete, and is a trifle over one-fourth of a volution in length. The narrowing of the abdomen with increase of age is very marked on the living chamber in this specimen. It measures 192 mm. in length along the abdomen, 73 mm. in the abdomino-dorsal diameter at the last septum, and about 52 mm. in the transverse diameter at the umbilical shoulders, and 34 mm. near the venter. The sides of the whorls are flattened and converge outwardly, so that the abdomen is considerably less in breadth than the dorsum in the large, full-grown stage. There is a shallow, impressed zone upon the dorsum, which occupies about one-third of its width, and is due to the slight rotundity of the abdomen and the small amount of involution in the coiling of the whorls. The umbilical shoulders stand out abrupt and broad, giving a depth to the wide umbilicus, which is a marked characteristic. The sutures have shallow, ventral lateral lobes. The saddles at the umbilical shoulders are broad and extend inwards to the edges of the impressed zone, and then the sutures bend toward the apex, forming a shallow dorsal lobe. There are no annular lobes in the center of the dorsal sutures. The siphon is above the center, and is apparently nummuloidal. At the diameter of 95 mm., the whorl has the following measurements: Abdomino-dorsal diameter, 41 mm.; transverse through the umbilical shoulders, 32 mm., and breadth of the abdomen was 25 mm.

Domatoceras (*Nautilus*) *complanatum*, sp. Sow. Min. Conch., pl. 261, from Isle of

Man, from carboniferous, is another form of this genus, having a very slight form of involution, with a compressed whorl and subacute abdomen. The involution is very slight in this species, exposing all the internal whorls, but in the transverse section of the outer whorl, and in the sutures, it is unquestionably related to the species described above. The living chamber is over one-half of a volution in length, but it is not certain from the drawing that it is completed.

The species differs from (*Discites*) *highlandense* Meek and Worthen, [see Geol. Illinois, VI, p. 531, pl. 33, fig. 2,] in being much larger, in having stouter whorls. The sutures are, however, evidently very similar. *Highlandense* is described as having a narrow periphery, whereas this shell, when about the same size as the specimen figured in the Illinois survey, has an abdomen almost as broad as the dorsum, and very much broader proportionately than in its own adult whorl. It differs from (*Naut.*) *planovolve* Shumard, [see Trans. St. Louis Acad., I, p. 190,] in size, and in having whorls with more rapid growth, and probably a wider and deeper umbilicus than in that species.

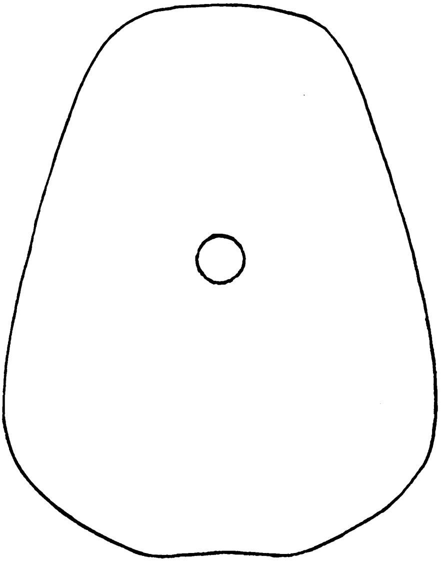

FIG. 12.

It differs from the nearest European congener *Kon. infundibulum*, as figured by De Koninck, [see Calc. Carb., pl. 24,] in having a narrower abdomen and a more compressed form of whorl in the adolescent and adult stages; also in the sutures, which have a more marked abdominal lobe. It differs from *Kon.* (*Nau-tilus*) *podolskensis* Marie Tzwetaev, [see Ceph. du Calc. Carb. de la Russie Centrale, pl. 3,] in the young. This is similar to the adult in the proportions of the parts, but in *K. podolskensis* the young whorl has an abdomen broader than the dorsum. The adult of this species also has a broader abdomen than the adult of our shell. The species evidently stands just between the genus represented by such species as *Kon. ingens*, *implicatum*, described by De Koninck, and *K. podolskensis*, all of which have stout whorls with broad abdomens, and whorls similar to those of the young of *K. umbilicatum*, and those species of the same genus having more contracted abdomens, like *mosquensis* (sp. Tzwetaev), *planotergatum* as figured by De Koninck, and *highlandense* (sp. M.and W.).

The last whorl was considerably altered by compression on one side.

ASYMPTOCERAS.

The *Cryptoceras Springeri* White and St. John, [see Trans. Chic. Acad., I, p. 124,] is the type of Meek's genus Solenocheilus, described in the "Invertebrate Paleontology," [see U. S. Geol. Surv. Terr., IX, p. 491,] and we quote from this volume the following: "The group for which Professor Worthen and the writer [Meek] used the name 'Solenocheilus' is almost entirely the same for which d'Orbigny proposed the name 'Cryptoceras' in 1850; but d'Orbigny's name cannot stand, because Barrande had used it for a genus of cephalopoda in 1846. It is true that Barrande subsequently changed the name of his genus to Ascoceras, because Latreille had, in 1804, used Cryptoceras for a genus of insects. If this was a sufficient reason, however, for changing Barrande's name, Latreille's Cryptoceras would be equally in the way of d'Orbigny's Cryptoceras; and if not, then Doctor Barrande's genus would have to retain his original name, which would render d'Orbigny's name equally untenable." *

In the Genera of Caphalopods I used the name of Ryckholt's Asymptoceras [see Notice sur le Asympt. et Vestin, 1852,] for this same group, of which the type was *Naut. cyclostomus* Phill. If Meek's reasoning holds good, it seems to us that both the names Cryptoceras and Solenocheilus should be dropped in favor of Asymptoceras. The whorls increase very rapidly in all their diameters, and the living chambers are correlatively short. The sides and venter are usually gibbous; the dorsum has either no impressed zone or only a very narrow zone of depression, showing how recent was the derivation of this group from the parent gyroceran forms. The siphon is so near the venter that it interrupts the suture in most species. So far as I have been able to see, however, it is to be noted that the edges of the suture do not bend backwards to form a siphonal lobe similar to that of an ammonoid. The siphon may become central in some adults, as in *Asympt. crassiventer*. The elliptical form of the young whorl, the large umbilical perforation, the simple, fine, smooth longitudinal ridges of the whorl in the young, and the presence of abrupt umbilical shoulders, indicate derivation from the open-whorled form, Aipoceras. The sutures have broad ventral, lateral and dorsal inflections or lobes, and small annular lobes.

The European species, so far as now known to me, are *Asympt. dorsale*, sp. Phill., *crassiventer*, sp. De Kon., *normale*, sp. De Kon., *latiseptatum*, sp. De Kon., *cyclostomum*, sp. Phill., and all of them are from the carboniferous. *Asympt. Springeri*, sp. White and St. John, *capax*, sp. Meek and Worthen, and the following, are all that are known to me in this country, all three being also carboniferous, coal measures.

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*NOTE.—The genus *Cryptoceras* was first described by d'Orbigny in his "Prod. Stratigraphique," (vol. I, p. 114,) *Naut. dorsalis* Phill. (Geol. Yorks., vol. II, pl. 17, fig. 17, pl. 18, figs. 1, 2) having been cited as the type. The name of the genus had, however, already been quoted on page 58 of the same volume, and *Naut. subtuberculatus* Sandb. mentioned below as a member of the genus. This species would, therefore, according to a very strict interpretation of the laws of priority, have to be considered the type. D'Orbigny, however, evidently meant his description on page 114, and the species there mentioned should be accepted, and considered the first mention on page 58 as a quotation.

I followed the first course in my Genera of Fossil Cephalopods (Proc. Bost. Soc. Nat. Hist., XXII, 1883, p. 283, and note, p. 297), reducing Cryptoceras, consequently, to a synonym of *Temnocheilus*. I brought together under this name, having *Tem. coronatus* McCoy (Syn. Carb. Foss. Ireland, pl. 4, fig. 15) as the type, all the nautiloids having ventral and dorsal lobes in their sutures, the siphon close to the venter, tuberculated shells, etc. There were, however, in reality, two groups of species included under this name in the essay alluded to, Asymptoceras in part and Temnocheilus as a whole. Temnocheilus should be limited to those species having discoidal whorls and open umbilici, in which the increase of the whorl by growth was slow along the abdomino-dorsal diameter, and much more rapid along the lateral or transverse diameter, especially near the angular junction of the sides and abdomen, the venter being, consequently, much broader than the dorsum, and the sides necessarily divergent, the umbilici deep. These also have large, blunt tubercles along the angular junctions of the sides and abdomen, and the sutures have broad ventral, lateral and dorsal lobes. The Devonian forms of Temnocheilus, so far as known, have no annular lobe in the center of the dorsal suture; but this is present in some carboniferous species, like *Tem. latus* De Kon. (Calc. Carb., pl. 24, fig. 2). The siphon, also, is near the venter in Devonian forms, but shifts nearer to the center in some carboniferous species, like *Tem. latus*. This organ, however, does not approach the periphery near enough to interrupt the line of suture on the venter in any species.

ASYMPTOCERAS NEWLONI, n. s.

Loc., Oswego, Kas. Coal measures.

Coll. Nat. Mus., Dr. Newlon.

The species in hand is a fragment very similar to *As.* (*Cryptoceras*) *capax* Meek and Worthen. [See Geol. Ill., VI, p. 532, pl. 33, fig. 1.] There are three air chambers incompletely preserved in the cast. The last two sutures are 17 mm. apart on the venter. The increase in size is very rapid, being as much as 46 mm. in the greatest transverse diameter, to 68 mm., a difference of 22 mm. in a distance of only 51 mm. as measured along the center of the venter, and only 35 mm. as measured along the side of the whorl.

These measurements show a more rapid increase than in the whorl of *Asympt. capax*. The sutures are not only wider apart than in that species, but the form of the whorl also differs. In the figure of *As. capax*, the greatest diameter of the living chamber is above or external to the umbilical shoulder, whereas in this species it is at the umbilical shoulder. The sides converge outwards from these shoulders and are not gibbous as in *capax;* and in the living chamber, which is evidently very nearly complete on one side, the whorl becomes flatter or more depressed on the abdomen than in *capax*, and the flaring of the aperture at the umbilical shoulders carries the lateral angles out with great rapidity. The diameter through the widest part of the whorl at the last suture is 68 mm., at a point about half way between this and the aperture about 82 mm., through the wings themselves not less than 120 mm., and perhaps a little more in perfect specimens.

The sutures have a distinct, but very shallow, broad lobe on the venter, which is irregularly interrupted by the siphon, and there are also shallow lateral lobes. In some specimens the sutures are very likely continuous, as they are in the figure of *capax*. If the side view of the sutures in the figure of *capax* is correct, these differ decidedly from those of this species. This shell differs from *Asym. Springeri* in having less angular umbilical shoulders, a more depressed abdomen, and more convergent sides. In fact, *Springeri* and *capax* resemble each other more than either of them resemble this species. [The species has been dedicated to Dr. W. S. Newlon, of Oswego, who found and sent the specimen, with some others described in this paper, to the National Museum.]

The comparative length of living chamber cannot be given, since the inner whorls were not visible.

PHACOCERAS DUMBLI, n. s.

Texas. Coll. Geol. Surv. of Texas.

Fort Riley, Kas. Coll. R. Hay.

The extraordinarily large size of this shell, its involute form, its compressed whorls, and the attenuated character of the outer part of the whorls in proportion to their transverse diameters, combined with the comparatively smooth and ribless shell, make this species interesting.

The umbilici are very narrow and small, the involution being almost complete. The increase of the vertical diameters by growth is extremely rapid, whereas the transverse diameters have increased very slowly, leaving whorls very much compressed or axe shaped. The broadest transverse diameters are near the umbilici, and from this part the whorl is slightly concave on both sides towards the periphery or abdomen. This, although very narrow, is flattened or slightly convex, even in the largest specimens.

The living chamber in one specimen was about one-half of a volution in length. The lines of growth indicate that the aperture probably had very broad lateral saddles and a single deep, narrow, median abdominal lobe.

The sutures are near each other, or slightly crowded in aspect. They have a narrow abdominal saddle, deep, broad lateral lobes, comparatively narrow lateral saddles near the umbilici, and a pair of shallow lateral lobes internally, on the shoulders of the whorls.

The shell is thin, and it is marked by fine lines of growth. The siphuncle is probably situated near the abdomen, but was not clearly seen.

A specimen sent me by Mr. Hay from Fort Riley is the most perfect specimen of this remarkable species that I have yet seen. It has an almost entire living chamber, about one-half of a volution in length, the sutures show well, and it is not as much compressed as specimens from Texas. All the specimens are reported as coming from carboniferous, as do all species of the genus so far found.

The sutures may have a slight lobe on the hollow of the narrow abdomen, where compression has affected them; where they are unaffected by compression, they are absolutely straight or very faintly concave. In Mr. Hay's cast, the outer part of the living chamber presents the abdomen as slightly convex, and leads one to think that the slight hollowness of the abdomen often present in younger whorls is due to compression. In fact, the whorl is broken along a line parellel with and near to the edge of the abdomen and is concave from compression on the right-hand (morphologically left) side until near the end of the living chamber. Here, where the abdomen presents a very flat convex surface, both sides of the whorl are unbroken and have the normal proportions.

This is the largest and finest species of the involute shells of this group yet found in the carboniferous. The principal differences between it and *Nautilus Rouilleri*, the adult of which was described and figured by Trautschold [see Kalbruche von Miatschkowo, p. 28, pl. 3, fig. 7,] under the name of *oxystomus*, [the name *Rouilleri* was given to this as the type in De Koninck's Calcaire Carbonifére, p. 124, in his description of *Nautilus oxystomus*, which last was afterwards taken by the writer as the type of his genus Phacoceras, in "Genera of Fossil Cephalopods," Proc. Bost. Soc. Nat. Hist., XXII, 1883, p. 292,] and the young by Marie Tzwetaev, [see *op. cit.*, p. 53, pl. 6, figs. 33 and 34,] consist in its size. The principal difference between the European and American is that the former retains throughout life —that is to say, on all parts of its largest whorl, which is much larger than that of the European species — the peculiar but flattened abdomen which is found only in the young of *Phacoceras Rouilleri*. This character is of genetic importance, and, together with the longitudinal ridges and form of the young in this species, and in *P. oxystomum*, show that these acute involute shells were derived by descent from more discoidal shells, like those of the genus Discitoceras. This·also serves the purpose of explaining the occurrence in the carboniferous of their apparently anachronic forms and structural characteristics. The aspect of the adults and the sutures in this genus are like triassic species, such as *Grypoceras* (*Nautilus*) *galeatus* Mojsisovics, and at first they appear to have occurred before their proper geologic period. When, however, their young are studied, it is plain that their shells at early stages have the ordinary characteristics of normal members of the carboniferous faunas, and that the peculiarities of later stages were evolved from purely carboniferous forms. Their mimicry of triassic shells in later stages must therefore be regarded simply as good examples of parallel progressive complications arising independently in different genetic series during different periods of time. In *Rouilleri* the flattened aspect of the crest of the abdomen is retained much longer in the course of the growth than in *Phacoceras oxystomum.* The American species, with its truncated abdomen existing in the adult, is therefore the most immature form of the group yet discovered, and although it is as yet impossible to come to any conclusion, this fact at present points to the fauna of this country at the place of origin or aldainic fauna of this series. *Rouilleri* is probably genetically connected with *P. Dumbli*, or some equivalent species, and *P. oxystomum* is similarly connected with *P. Rouilleri*. In both of these, however, it is superseded in the subsequent stages of shell growth by an acute abdomen.

NOTE.—I find from correspondence with Professor Hyatt, (April 25, 1893,) that he has ascertained that the genus *Phacoceras* is distinct from the group to which *dumbli* ought to be referred, and he will give another generic name in his forthcoming report on carboniferous cephalapods, to be printed in the next Annual Texas Report.

THE FORMATION OF DONIPHAN LAKE, IN THE SPRING AND EARLY SUMMER OF 1891.

BY E. B. KNERR, ATCHISON.

Though the formation of narrow lakes by rivers leaving their old courses and cutting new channels in times of freshet is by no means unusual, yet in the case of large rivers, such as the Missouri, these formations are never without some interesting features.

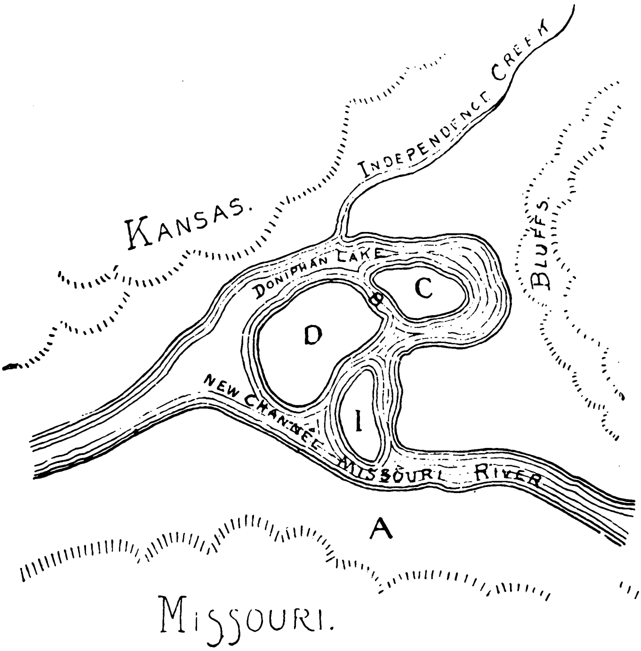

FIG. 13.

Prior to the present year, the Missouri river made quite a detour some five miles north of Atchison, about a point known as "Doniphan point," and each year it kept extending the bend further northward, encroaching quite rapidly upon the site of what was once the thriving little town of Doniphan. Time and again new roads had to be cut further in from the river. But during the early rises of the present